NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
FENCING
(FT)
CODE 382

DEFINITION

Enclosing or dividing an area of land with a suitable permanent structure that acts as a barrier to livestock, big game, or people (does not include temporary fences.)

PURPOSE

To exclude livestock or big game from areas that should be protected from grazing; confine livestock or big game on an area; control domestic livestock while permitting wildlife movement; subdivide grazing land to permit use of grazing systems; protect new seedings and plantings from grazing; and regulate access to areas by people or prevent trespassing.

CONDITIONS WHERE PRACTICE APPLIES

On any area requiring control or exclusion of livestock or big game or regulation of access by people.

WATER QUANTITY

Normally fencing will have no effect on the quantity of surface and ground water. Refer to the conservation practices of which this is a component to determine the effect on water quantity and quality.

WATER QUALITY

Fencing is a practice that can be on the contour or up and down slope. Often a fence line has grass and some shrubs in it. When a fence is built across the slope, it will slow down runoff and cause deposition of coarser grained materials reducing the amount of sediment delivered downslope. Fencing may protect riparian areas which act as sediment traps and filters along water channels and impoundments.

Livestock have a tendency to walk along fences. The paths become bare channels which concentrate and accelerate runoff, causing a greater amount of erosion within the path and where the path/channel outlets into another channel. This can deliver more sediment and associated pollutants to surface waters. Fencing can have the effect of concentrating livestock in small areas, causing a concentration of manure which may wash off into the stream, thus causing surface water pollution.

PLANNING CONSIDERATIONS FOR WATER QUANTITY AND QUALITY

Quantity

1. No considerations noted.

Quality

1. Construction effects on erosion and the movement of sediment.

PLANNING CONSIDERATIONS

Kinds and habits of livestock and wildlife; location and adequacy of water facilities; topographic features; soil-site characteristics; locating fences in relation to livestock handling facilities; equalization of forage-producing ability among grazing units as feasible and practical; proposed or potential grazing system and compliance with any fencing codes or regulations. These specifications are minimum. For hazardous situations, such as livestock fencings along highways, a more substantial fence may be required.

SPECIFICATIONS

TABLE 1

Fence Construction for Barbed Wire or Woven Wire
Non Electric Fence

Use	Height (inches)	Barbed Wire Strands	Woven Wire Stay Spacing (inches)
Cattle or mixed livestock	44	3 to 4	6 to 12
Hogs	32	2	6
Sheep or Goats	39	4	6 to 12
Horses	48	-----	6 to 12

A. Nonelectrical Fences

1. Barbed Wire Fence - The strands shall be spaced approximately equal distance apart. The bottom wire shall be approximately 14 to 18 inches above the ground level. The barbed wire shall be two twisted strands of 15-1/2 gauge or heavier wire with two-point barbs on approximately 5-inch centers. The wire and barbs shall be galvanized. See Table 1.

2. Woven Wire Fence - Fence with woven wire less than 32 inches high shall have at least two barbed wires above the woven wire. Fences with woven wire 32 inches or higher must have at least one barbed wire above the woven wire. The top and bottom wires in the woven wire shall be 12-1/2 gauge or heavier, and line and stay wires shall be 14-1/2 gauge or heavier, and line and stay wires shall be 14-1/2 gauge or heavier. All wires shall be galvanized. See Table 1.

   The barbed wire above the woven wire shall meet the barbed wire specifications.

3. Other

   The specs for Electric Fences - Conventional, shall be followed that apply to:

   a. Wooden Fence Posts and Braces

b. Steel Posts

c. Bracing

d. Trees

e. Spacing

B. Electric Fences - Conventional

A permanent electric fence shall have at least one strand of smooth or barbed wire. Caution should be used with barbed wire electric fences. The spacing of posts shall be a maximum of sixteen feet.

Manufactured fence chargers are to be used which are approved by Underwriters Laboratories (UL) or the U.S. Bureau of Standards, with notice of approval printed on controller name plate. Fence chargers may be powered by 120 volt alternating current, or solar or batteries. Installation of the charger will be of according to manufacturer's instructions.

Homemade fence chargers are not acceptable or recommended for use with fencing. Wire for use with electric fences will be 15-1/2 gauge for barbed wire and 14 gauge for smooth wire.

Manufactured fence insulators are to be used to fasten electric wire to the post. Non-electric wires do not need to be insulated by the fastening system.

1. Staples

a. Staples shall be 9-gauge galvanized wire and have a minimum length of 1.5 inches except 1 inch minimum length will be permitted for very hard wood such as oak.

b. Staples shall be driven diagonally with the wood grain to avoid splitting. The staples shall not be driven into the post so deeply that the coating of the wire is damaged.

c. Wire fasteners made of 16 gauge or heavier galvanized wire may be used in lieu of staples for fastening wires to wood or steel posts.

2. Wooden Fence Posts and Braces

a. Untreated posts of black locust, red or white-cedar, or other wood of equal life and strength are acceptable. Pressure preservative treated pine or other wood of equal life and strength are acceptable. All corners, gates, and end posts, as well as bends greater than 15 degree angle, are to be braced and these posts are to be set a minimum of 3 feet below ground lines.

b. Size - Line posts will have a minimum diameter of 3 inches and to be of sufficient length to support the height of the fence, and be firmly set or driven in the ground a minimum depth of 2 feet. Corners, gate ends and brace posts will have a minimum top diameter of 5 inches, to be sufficient length to support height of fence, and be firmly set or driven in the ground a minimum depth of 3 feet.

3. Steel posts - Standard "tee" or "u" section steel posts weighing not less than 1.3 pounds per foot of length may be used in lieu of wooden line posts. Lengths shall be the same as for wooden posts. Steel posts shall be studded, embossed or punched for attaching the wire to the

posts. The wire shall be attached to the post by wrapping No. 16 gauge galvanized wire or by use of manufactured wire clips.

4. Bracing - Required at all corners, ends, gates, and all definite angles 15 degrees or more in the fence line. Vertical brace posts shall be minimum of 5 inches in diameter and a minimum length of 7.5 feet, and of acceptable species of wood required for posts.

   Braces must have a minimum 3-inch diameter or square. The distance between brace posts and end, gate or corner post shall be 6 to 8 feet. The brace shall be placed about 1 foot below the top of posts, notched into each post 1 inch and ends spiked to posts. A diagonal brace wire made of four strands of 9 gauge wire or four strands of 12-1/2 gauge barbed wire shall be fastened around the brace post 4-6 inches from the top and extended to and fastened around the end, gate or corner post 0-4 inches above ground.

   Brace wire shall be tightened until brace and posts are rigid. Slats or rods used for tightening may be left in the twist. Corner post shall have a brace post and bracing on both sides.

5. Trees - Can be used in place of posts and corners if trees are in line with the fence, sound and meet the size requirements of this specification. When trees are used as a substitute for posts, the fence should be attached to a board or 2 x 4 that has been attached to the tree.

6. Spacing - Maximum acceptable distance between posts is 16 feet.

C. Nonelectric Fence - High Tensile

1. Wire

   a. Fences will be constructed or at least six wires with the total height of the fence to the top wire not less than 46 inches.

   b. Wire will be new, smooth, and meet or exceed the following:

   Tensile strength - 200,000 psi
   Galvanizing - Type III
   Gauge - 12-1/2

2. Spacing and Height - See Table 2 for wire spacing and heights. Adjustments in number of wires and spacing may be made if they strengthen the effectiveness of the fence.

Fence Description			Wire Spacing from Earth (inches) (Reading Left to Right)
10 Strand	Livestock	Fence	4-4-4-4-5-5-5-5-5
10 Strand	Livestock	Feedlot	10-4-4-4-5-5-5-5-5-5
8 Strand	Cattle	Fence	4-5-5-5-6-6-7-8
6 Strand (not calves)	Cattle	Fence	14-5-6-6-7-7

3. Tension Springs - 200 to 250 pounds each wire. Tension with an inline stretcher. Install a tension spring on all wires. Use inline wire tightner on each strand. Tension may be reduced during non-grazing periods.

4. Fastening -

   a. At gate, corner, and end braces, wrap and twist wire or use crimping sleeves or wire anchor through posts for maximum strength.

   b. Staple wire to posts with 1-3/4 inch by 9 gauge galvanized staples with slash cut points. Do not drive staples tight in line posts. Angle staples to prevent post splits. Drive into post at downward angle on knolls and at an upward angle in depressions.

   c. Angle notched posts do not need fasteners.

   d. Wire clips will be used to fasten wire to straight notched and fiberglass posts.

   e. Spring Assembly - Each wire shall have one spring assembly per 1800 feet.

5. Posts - All posts shall be black locust, red or white-cedar or wood of equal life and strength. Use either round or equivalent sawn posts.

   a. Corner or Gate Posts -

      (1) 6" diameter x 8' long.

      (2) Set 4' deep.

   b. Spacing of Fence Posts

TABLE 3

NUMBER OF LINE WIRES	MAXIMUM SPACING OF PRIMARY LINE POSTS WITHOUT SPACERS	WITH SPACERS	MAXIMUM SPACE INTERVAL
1	150'	-----	----
2	75'	150'	75'
3	50'	150'	50'
4	50'	150'	50'
5	50'	150'	50'
6	33'4"	100'	33'4"
8	33'	66'	33'
9	20'	60'	20'

6. Spacers - Pressure treated hardwood, 40-48" x 1-1/2" x 1" or LD fiberglass notched "T" posts 4-5' long.

7. Brace Assembly - A double brace assembly will be used for gated, ends and corners (See Figure 1).

a. Double Brace Posts - 5" diameter x 7-1/2" long, set 3-1/2 - 4' deep.

b. Horizontal Brace Pipe - 4" diameter x 7-1/2' to 8' long, place 3-4' above ground.

c. Brace Posts Pins - 3/4" x 9" and 3/4" x 4" galvanized steel rods.

d. Brace Wires - 12-1/2 gauge high-tensile wire, double wrapped with 1-1/2" x 2" x 2' hardwood twist stick.

D. High Tensile - Electric Fences

This type of fence may be installed to meet approved manufacturers specifications, or a "generic" fence may be constructed to meet the following specs:

To determine if manufacturers specifications meet this specification - submit them to the State Office for review.

1. Wide Spacing

a. Outside (perimeter) fences will be constructed with high-tensile steel and sufficient wires to meet or exceed the following:

TABLE 4

ELECTRIC FENCE - HIGH TENSILE

CLASS OF LIVESTOCK	NO. WIRES	NO. ELECT.	WIRE SPACING STARTING FROM EARTH. INCHES READING LEFT TO RIGHT
Milking Cows	1	1	30
Cows and Calves or Horses and Foals	2	2	17-38
Hard to Hold Cattle	3	3	17-27-38
Boundary Fence for Sheep, Lambs and Cattle where dogs are a problem	5	Varies	5-10-17-27-38

b. Interior (subdivision) fences will be constructed using either polywire and movable posts or steel wire and permanent post/spacer combinations. One, two or three wires may be used depending on the needs of the grazing system. At least one wire must be electrified.

2. Energizer - The following specifications are minimum:

a. Lists with Underwriters Laboratories (UL).

b. Low impedance, with minimum 5000 volt peak output, 2.3 millicoulombs charge.*

c. Maximum 3/10,000th's of a second charge duration, and minimum .75 second between pulses.*

d. High impact weather resistant case.

* Variation from these values is acceptable if manufacturers recommendations allow for it.

e. Safety pace fused.

f. 110 volt Alternating Current or 12 volt battery powered system.

g. Grounded per manufacturer's recommendations.

3. Insulators

a. Choose from the following:

(1) High density moulded black plastic, U.V. light resistant.

(2) Flexible tube type.

(3) High density porcelain.

b. Insulators must be strong enough to support long strands of wire, and must allow the wire to slide freely.

4. Other - The specs for nonelectrified, high tensile fence shall be followed that apply to:

a. Wire material.

b. Wire tension and spring assembly.

c. Wire fastening (staples).

d. Posts and spacing.

e. Spacers.

f. Gate, end, and corner bracing.

g. Fence installation.

Fence Installation

1. Install wire in sections, stretching from corner or pull posts to next post to obtain a straight tight tension in the wire.

2. Attach wire to side of posts next to livestock, except on curves. Fasten the bottom wire first, then the next highest, etc.

3. Staples shall be driven diagonally with the wood grain to avoid splitting. Space should be left between staples and posts to permit movement of the wire.

E. Speciality Fences

For control of exclusion of big game or regulation of access by people. Speciality fences shall be installed in accordance with sound construction practiced for the intended purpose. Each speciality fence will require a custom design approved by the Natural Resources Conservation Service.

F. Speciality Fences - Speciality Fence For Controlling Access By People To Manure Storage Facilities

Fences shall be constructed a minimum of 4 feet high with woven wire. Fence shall be constructed so wire is close to the ground and to prevent people from going under fence. Gates if installed will be of good quality and easy to open and close. Gate latches will be hard for children to operate. Fence will be located at or near the top of the manure storage facility. A second fence may be needed at the toe of this slope to control access by cattle to the slope. This second fence for livestock control will need specifications for livestock control.

G. Electric Fences - Moveable

A moveable electric fence must have enough electrified strands to control the type and age of livestock that are using the area. Posts must be spaced so electrified strands do not touch ground or other strands. Posts must maintain strands at elevation suitable to control planned livestock.

Moveable electric fence will be in place when livestock are grazing the area. Wire and posts installations must meet the manufacturer's recommendations.

Manufactured fence chargers are to be used which are approved by Underwriters Laboratories (UL) or the U.S. Bureau of Standards, with notice of approval printed on controller name plate. Fence chargers may be powered by 120 volt alternating current, or solar or batteries. Installation of the charger will be of according to manufacturer's instructions. Fence charger will be type appropriate for the type of wire and posts being used.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing fencing shall be prepared in accordance with the criteria contained in this standard and shall describe the requirements for applying the practice to achieve its intended use.

Operation and Maintenance

In the spring of each year, after frost has left the ground, fences will be checked for repair and mending due to the winter elements; line posts will be redriven, wires will be repaired and tightened where broken, or loosened due to snow and ice loads, and staples or insulators will be replaced where they were dislodged. Moveable fences will be moved back to specified location before grazing of the area begins.

FINAL DOCUMENTATION REQUIREMENTS

The completed work is to be checked and documented to verify that this practice was completed according to this standard and specifications. Supporting data for documentation are:

1. Length of fence installed.
2. Type of fence and other materials installed.
3. Signature of performance checker.